AMENDMENT TO THE CLAIMS

In The Claims

Claims 1-42 remain in this application. Claims 1 and 10 have been amended. No claims have been canceled. No new claims have been added.

A listing of claims follows:

1. (currently amended) An apparatus comprising:

a plurality of wavelength division multiplexing access nodes of an optical network employing a source based scheme to establish communication paths, each of said plurality of access nodes storing a set of one or more network topology databases specific to that access node based on a set of one or more connectivity constraints, wherein network topology is the paths and wavelengths of all possible communication paths from that access node to other nodes, and wherein the wavelengths for each path are the set of wavelengths of each link of that path that are available for establishing lightpaths on that path.

2. (original) The apparatus of claim 1, wherein said communication paths include lightpaths.

3. (original) The apparatus of claim 1, wherein said communication paths include one or more of optical circuits, lightpaths, and end-to-end unidirectional paths.

4. (original) The apparatus of claim 1, wherein the set of one or more network topology databases in each of said plurality of access nodes stores a conversion free topology for that access node.

5. (original) The apparatus of claim 1, wherein said plurality of access nodes to establish communication paths in real time.

6. (original) The apparatus of claim 1, wherein the set of one or more connectivity constraints includes quality of service (QoS) based criteria that divides said optical network into separate service levels, and the set of one or more network topology databases in each of said plurality of access nodes stores a conversion free service level topology for that access node for each of the service levels.

7. (original) The apparatus of claim 6, wherein the set of network topology databases in each of said plurality of access nodes includes a separate network topology database for each of the conversion free service level topologies for that access node.

8. (original) The apparatus of claim 1, wherein the set of network topology databases in each of said plurality of access nodes is built and maintained by that access node.

9. (original) The apparatus of claim 1, further comprising:

a centralized network management server communicatively coupled to each of the plurality of access nodes to build and maintain the set of network topology databases in each of said plurality of access nodes.

10. (currently amended) An apparatus comprising:

a wavelength division multiplexing optical network including a plurality of access nodes each including,

for each link connected to the access node, a link channel set representing at least certain wavelengths on that link available for establishing a lightpath, wherein a lightpath is a wavelength and a path, wherein the path of a given lightpath is a series of two or more nodes and links interconnecting them through which traffic is carried by the wavelength of that lightpath, wherein said series of nodes respectively starts and ends with a source node and a destination node, and

a database representing conversion free connectivity from the access node to others of said access nodes using the wavelengths in said link channel sets, wherein said conversion free connectivity includes the paths and wavelengths of possible lightpaths having the access node as the source node and others of the access nodes as the destination node.

11. (original) The apparatus of claim 10, wherein each of said plurality of access nodes also includes an allocate module to, responsive to requests for communication paths received by that access node, select and allocate in real time lightpaths having that access node as the source node.

12. (original) The apparatus of claim 10, wherein the optical network is divided into a plurality of service levels, wherein different wavelengths on at least certain links of said optical network qualify for different ones of said plurality of service levels, said database representing conversion free connectivity using wavelengths that qualify for only one of said service levels.

13. (original) The apparatus of claim 12, wherein each of said plurality of access nodes also includes, for each of the others of said plurality of said service levels, another database representing conversion free connectivity from the access node to others of said access nodes using wavelengths that qualify for that service level.

14. (original) The apparatus of claim 10, wherein the database in each of said plurality of access nodes is built and maintained by that access node.

15. (original) The apparatus of claim 10, further comprising:

a centralized network management server communicatively coupled to each of the plurality of access nodes to build and maintain the database in each of said plurality of access nodes.

16. (original) A method comprising:

each of a plurality of access nodes of a wave length division multiplexing optical network, tracking wavelengths for each link of the wave length division multiplexing optical network connected to that access node;

each of said plurality of access nodes, maintaining a topology based on conversion free connectivity to others of said plurality of said access nodes; and

responsive to a request for a communication path received by any one of said plurality of access nodes, that access node,

selecting both a path through a set of one or more links of said optical network and a single wavelength available on everyone of said set of links based on said topology maintained in that access node, and

causing allocation of said selected path and wavelength.

17. (original) The method of claim 16, wherein said communication path is a lightpath.

18. (original) The method of claim 16, wherein said communication path is an optical circuit.

19. (original) The method of claim 16, wherein said selecting and said allocation is performed in real time.

20. (original) The method of claim 16, wherein the topology maintained by each of said plurality of access nodes is also based on connectivity at one of a plurality of service levels, wherein different wavelengths on at least certain links of said optical network qualify for different ones of said plurality of service levels.

21. (original) The method of claim 16, wherein said tracking includes operating a link management protocol in each of said plurality of access nodes.

22. (original) The method of claim 16, wherein said maintaining includes each of said plurality of access nodes communicating with others of said plurality of access nodes.

23. (original) The method of claim 16, wherein said maintaining includes each of said plurality of access nodes communicating with a centralized network management server.

24. (original) The method of claim 16, wherein the topology for each of said plurality of access nodes includes the available wavelengths and the status as either allocated or unallocated.

25. (original) An apparatus comprising:

an access node, to be coupled in a wavelength division multiplexing optical network, including,

a link state database to store, for each link connected to said access node, a link state structure to store a port of the access node to which that link is connected and available wavelengths on that link,

a database to store a representation of available paths from the access node to others of said access nodes using the wavelengths in said link state database, wherein a path is a series of two or more nodes connected by links on which a common set of one or more wavelengths is available for establishing one or more lightpaths, and

a module to, responsive to requests for communication paths received by said access node, select from unallocated ones of said available paths and the common set of wavelengths thereon a selected path and wavelength.

26. (original) The apparatus of claim 25, wherein said module to perform said selection and cause allocation of said selected path and wavelength in real time.

27. (original) The apparatus of claim 25, wherein the optical network is divided into a plurality of service levels, wherein different wavelengths on at least certain links of said optical network qualify for different ones of said plurality of service

levels, said database to store a conversion free service level topology structure for each of said plurality of service levels.

28. (original) The apparatus of claim 25, wherein said access node includes additional modules to build and maintain said database in said access node.

29. (original) The apparatus of claim 25, further comprising:

a centralized network management server communicatively coupled to said access node to build and maintain the database.

30. (original) The apparatus of claim 25, wherein said access node includes a link management protocol to populate said link state database.

31. (original) A method comprising:

receiving, at an access node of an wave division multiplexing optical network, demand criteria representing a request for a communication path;

selecting a path and a wavelength on said path using a database that is stored in said access node and that stores a representation of available paths from the access node to others of said access nodes in said optical network, wherein each path is a series of two or more nodes connected by links on which a common set of one or more wavelengths is available for establishing one or more lightpaths; and

said access node communicating with those of the access nodes on the selected path to cause allocation of the selected wavelength on the selected path.

32. (original) The method of claim 31, wherein said communication path is a lightpath.

33. (original) The method of claim 31, wherein said communication path is an optical circuit.

34. (original) The method of claim 31, wherein said selecting and said allocation is performed in real time.

35. (original) The method of claim 31, wherein the optical network is divided into a plurality of service levels, wherein different wavelengths on at least certain links of said optical network qualify for different ones of said plurality of service levels, said database to store a conversion free service level topology structure for each of said plurality of service levels.

36. (original) The method of claim 31, wherein the database includes the available wavelengths and the status as either allocated or unallocated.

37. (original) A machine-readable medium that provides instructions that, if executed by a processor, will cause said processor to perform operations comprising:

responsive to receiving, at an access node of an wave division multiplexing optical network, demand criteria representing a request for a communication path, selecting a path and a wavelength on said path using a database that is stored in said access node and that stores a representation of available paths from the access node to others of said access nodes in said optical network,

wherein each path is a series of two or more nodes connected by links on which a common set of one or more wavelengths is available for establishing one or more lightpaths; and

causing said access node communicating with those of the access nodes on the selected path to cause allocation of the selected wavelength on the selected path.

38. (original) The machine-readable medium of claim 37, wherein said communication path is a lightpath.

39. (original) The machine-readable medium of claim 37, wherein said communication path is an optical circuit.

40. (original) The machine-readable medium of claim 37, wherein said selecting and said allocation is performed in real time.

41. (original) The machine-readable medium of claim 37, wherein the optical network is divided into a plurality of service levels, wherein different wavelengths on at least certain links of said optical network qualify for different ones of said plurality of service levels, said database to store a conversion free service level topology structure for each of said plurality of service levels.

42. (original) The machine-readable medium of claim 37, wherein the database includes the available wavelengths and the status as either allocated or unallocated.